

experts of every kind at Peradeniya, and a similar organisation is in process of establishment in the Federated Malay States. The rubber industry of the Straits Settlements owes its success to the Director of Public Gardens at Singapore. Besides Pusa, India has experienced botanical experts, all university men, at Calcutta, Madras, and Saharunpore.

Our self-governing colonies know pretty well how to take care of themselves. All possess agricultural departments and produce journals which will compare more than favourably with anything at home. In Canada the Central Experimental Farm at Ottawa is certainly not eclipsed by any institution in the United States. I may be pardoned a little vanity if I remark that when the Transvaal Government applied to Washington for an agrostologist it received a Kew man.

To sum up. What the Home Country can supply to the Empire is:—(1) cultural instructors such as are trained for the purpose at Kew; (2) men with a sound scientific training and a firm grasp of the principles underlying agricultural practice of whatever kind, and for these we must look to the universities. Men who are merely familiar with British agricultural conditions will be mostly of little use unless they possess the flexibility of mind which will apply theory to new and unfamiliar conditions.

W. T. THISELTON-DYER.

#### NOTES.

THE position of the South Africa medal fund for the endowment of a medal and scholarship or studentship in commemoration of the visit of the British Association to South Africa in 1905 is stated in a circular just issued by Prof. J. Perry, honorary treasurer to the fund. The subscriptions promised or paid amounted to 752*l.*; and to this the council of the British Association has resolved to add the unexpended balance of the special South African fund, amounting to about 800*l.* The following report of the executive committee was adopted at a meeting of subscribers on March 2, and approved by the council of the British Association:—(a) That the fund be devoted to the preparation of a die for a medal to be struck in bronze, 2½ inches in diameter, and that the balance be invested and the annual income held in trust; (b) that the medal and income of the fund be awarded by the South African Association for the Advancement of Science for achievement and promise in scientific research in South Africa; (c) that, so far as circumstances admit, the award be made annually. It is to be hoped that a fund raised for so excellent a project will receive a substantial increase from members of the association who have not already contributed to it, or from subscribers who may wish to add to their subscriptions.

THE terrible mine explosion at Courrières, in the Pas de Calais, on the morning of March 10, involving the loss of about 1200 lives, has naturally led to all sorts of conjectures as to the immediate cause. As usual, atmospheric conditions are said to have played a not unimportant part in bringing about the tragedy. In some mysterious way the very low barometric pressure over the North Sea on March 12, two days later, is supposed to explain the disaster. If, however, attention is concentrated on the atmospheric conditions prevailing at the time of the accident, it will be found that they resembled those which have accompanied the majority of the great disasters of the past fifty years. The *Bulletin météorologique de France* shows that during the night of March 9 a well

marked anticyclone extended from Spain in a north-easterly direction across France and the Netherlands, so that at 7 a.m. on March 10, when the calamity occurred, the barometer over the Lens district had risen to 765 mm. (30.1 inches); it had, in fact, mounted nearly a quarter of an inch in the course of the night. Obviously, if atmospheric pressure played any part in bringing about the catastrophe, the latter cannot in any way be associated with a low and falling barometer.

THE death of Mr. William Sowerby, for many years secretary of the Royal Botanic Society, Regent's Park, occurred at his residence in Hertfordshire on March 9. A grandson of James Sowerby, the famous illustrator of "English Botany" and of "British Conchology," and son of James de Carle Sowerby, another gifted naturalist, Mr. W. Sowerby inherited the family taste for natural history. He was responsible for the drawing of some botanical plates, but early in life he became associated with the Royal Botanic Society through his father, who was a founder and the first secretary, and in Regent's Park he worked for half a century. An observation which brought his name prominently before the public was the discovery of a medusa in the Victoria Regia tank, this being the first record of a medusa in fresh water, not to say in a most unexpected locality. He was keenly interested in economic plants, and not only did he bring together a unique collection, but he obtained fruit and fibre, the latter being distributed on several occasions to commercial men for trial. Among his successful experiments was the cultivation of the white mangrove, *Avicennia*, that flourished and produced aerial roots in artificial brackish water; he also demonstrated that seaweeds could be grown in tanks in the greenhouses.

It is reported from Tokio that a severe earthquake has occurred at Kagi, in Formosa. Many hundreds of persons have been killed and injured, and a large number of buildings have been destroyed.

A REUTER message from New York states that, according to advices from Honolulu, a volcano in Savaii Island (Samoa) is in eruption on a large scale. Three villages have been completely destroyed, including Maleda. The lava stream is three-quarters of a mile wide, and is flowing into the sea.

DR. H. C. BASTIAN, F.R.S., gave a demonstration, with the aid of lantern slides, "On some Heterogenetic Processes," on March 15 at the rooms of the Medical Society. Various micro-organisms were exhibited with the view of meeting the objections that have been raised to Dr. Bastian's interpretations of the transformations observed. An account of Dr. Bastian's remarks is given in the *Lancet* for March 17.

THE secretary of the Decimal Association informs us that he has within the past few days received fifty-three promises of support from newly elected members of Parliament. In the last parliament there were 330 members pledged to support the adoption of the metric weights and measures in this country, and at the present time 253 votes can be relied upon in the House of Commons. Additional assents are being received day by day, and it is probable that when the canvass now proceeding has been completed there will be as many supporters in the present parliament as there were in the last.

THE report of the late Dr. S. P. Langley, secretary of the Smithsonian Institution, Washington, for the year ending June 30, 1905, shows that much valuable scientific

work is accomplished year by year as a result of the grants made by the institution from the Hodgkins fund administered by it. One such piece of research is that in connection with speech or phonetics, by Dr. E. W. Scripture, who has secured individual gramophone voice records of much historical interest. A voice record of the German Emperor was transmitted by Dr. Scripture in January, 1905, for preservation in the United States National Museum. This record gives, in about 200 words, the Emperor's conception of the aims and beauty of true manhood and of man's duty to his fellow. It is stated that at present only one other record of the Emperor's voice exists, namely, one made at the same time for preservation in the library of Harvard University. Among other important researches aided by the Hodgkins fund may be mentioned the investigations of the upper air currents by means of kites by Dr. A. L. Rotch, of Blue Hill Meteorological Observatory; the experiments conducted by Mr. Alexander Larsen, of Chicago, in connection with the photography of lightning flashes and the fluorescence of minerals; the serial instantaneous photographic study of the flight organs of animals, by Dr. von Lendenfeld; and Prof. W. P. Bradley's experimental investigation of the expansion of air through a nozzle.

THE amphipod crustaceans of Catherine Bay, Murman coast, form the subject of an illustrated paper by Mr. E. van der Brüggen published in the last issue of *Trudui* of the St. Petersburg Academy for 1905.

A PAPER on Californian reptiles, by Dr. S. E. Meek, just issued by the Field Columbian Museum, contains descriptions, with figures, of two species of rattlesnake regarded as new, as well as notes on a number of other snakes and lizards.

WE have received from the Field Columbian Museum at Chicago a copy of a "Check-list of Mammals of the North American Continent, the West Indies, and the Neighbouring Seas," compiled by Dr. D. G. Elliot, and issued by the museum. This bulky volume purports to include the names of all species of mammals inhabiting America as far south as Colombia that have been described up to the date of publication. It is, in fact, supplementary to the author's two previous synopses of American mammals.

"THE Ideal Thoroughbred Stud" forms the subject of No. 8 of Rural Studies Series, this being the title of a lecture by the Rev. E. A. Woodruffe-Peacock, the well known specialist on soils and grass-lands. With a full knowledge of most large English stud-farms, the author expresses his opinion that there is not one which has not at least some deficiency; and after pointing out the lines on which an ideal stud should be formed, he observes that "the birthplace of a long and steady series of race-winners cannot be a matter of mere chance."

THE March number of the *Naturalist* contains an attractive coloured plate representing a pair of bearded tits in their native marsh. The contents include Mr. G. W. Lamplugh's presidential address to the Northern Naturalists' Union at Bradford on January 27, having for its subject the necessity for the amateur spirit in scientific work. Attention is directed not only to the valuable work accomplished by amateurs in the past, but also to the many fields in which their assistance is of the utmost importance at the present day. As an instance, the official geologist cannot possibly devote long periods of time to particular sections or pits, whereas an amateur living in the

neighbourhood can easily do so, and thereby is not unfrequently able to solve a problem which has been inexplicable to his professional brother.

THE programme of the July conference of the Museums Association at Bristol is outlined in the February issue of the *Museums Journal*. Among the articles is one by Mr. H. Bolton on the future of museums, being the report of a paper read at last year's conference. The author urges the advisability of a Government grant being paid annually to provincial museums of first-class standing, in return for which such institutions should be severally expected to perform a certain amount of allotted work, and in all instances to maintain a high standard of excellence. Another address at the same meeting, by Mr. S. L. Mosley, had for its subject museums and private collections, the author pointing out how much good a private collector can do by working for a museum, and how much harm when seeking his own ends.

IN the opening article in the February number of the *American Naturalist* Dr. H. Ayers, taking for his text "the unity of the gnathostome type," urges that there is neither anatomical nor embryological ground for removing amphioxus from the vertebrate class, and that we may class this creature as the sole representative of the Acrania, in contrast to the Craniata, which includes all the rest. Not only so, but the discovery by the author of rudimentary jaw-structures in the lampreys renders the division of the Craniata into Cyclostomata and Gnathostomata no longer tenable. The Gnathostomata must comprise, therefore, the Marsipobranchi as well as all the forms previously included, so that all Craniata are Gnathostomes. The origin of the craniofacial apparatus is thus to be sought in the missing links between amphioxus and the Craniata. Old age in brachiopods, by Dr. H. W. Shymer, and the habits of the American spotted salamander, *Necturus maculosus*, by Prof. A. C. Eycleshymer, form the subjects of the other two articles in the same issue.

*Science* of February 16 contains a report of an address delivered by Dr. C. H. Merriam, as vice-president and chairman of the zoological section, at the New Orleans meeting of the American Association for the Advancement of Science, on the question whether mutation is a factor in the evolution of the higher vertebrates. As the result of a long practical acquaintance with American mammals, Dr. Merriam is of opinion that there is no evidence of origin by mutation (sudden marked variation) in this class, but that everything points to variation by insensible degrees. Here the author takes occasion to mention that among mammals there is abundant evidence of the gradation of one species or race into another, so much so that specific or racial separation of specimens is often difficult. While admitting that in rare instances species of plants may arise by the perpetuation of "sports," Dr. Merriam states his contention to be that "the overwhelming majority of plants, and so far as known, all animals, originate in the generally recognised way, by the gradual development of minute variations."

It is encouraging to notice the growing appreciation on the part of Government departments and colonial administrators of the benefits to be derived from the application of scientific methods under expert guidance to pearl and other fishery industries. In the proposal to lease the pearl fisheries to a company for a period of twenty years recently laid by the Governor of Ceylon, Sir Henry Blake, before his Legislative Council, it was expressly stipulated "that

a sum of not less than Rs. 50,000 be expended annually on the scientific development of the banks." The Torres Straits pearl-shell fisheries, it seems likely, will also be put under scientific control and cultivation. In a report by Mr. W. Saville-Kent to the Queensland Government (1905) it is shown that the pearling industry to the north of Australia is in a depressed condition due to over-depletion of the natural shell-beds, so that they can no longer be worked at a profit. Mere closure of the beds against fishing is regarded as an inadequate measure, since the remaining molluscs are too few and too scattered to ensure sufficiently rapid propagation to re-populate the ground in a reasonable time. Mr. Saville-Kent recalls what is known of the breeding habits of the animals, and of their suitability for transplantation, and recommends the establishment of at least six "Government pearl-shell breeding reserves" at what seem to be suitable spots in the Torres Straits area. At each reserve about 1000 adult pearl oysters will be kept for breeding purposes enclosed in frames of wire-netting, and Mr. Saville-Kent is of opinion that "within a period of three or four years . . . the adjacent waters within many miles from these breeding centres should be restocked with young shell to such an extent as to permit of profitable fishing." He also recommends the establishment of an experimental cultivation laboratory on the small islet of Wai Weer at Thursday Island, and suggests, further, that a consignment of the Ceylon pearl oyster should be laid down on the Torres Straits ground. It is evident that a good deal in the way of scientific cultivation could also be done by collecting the spat and by culturing the ground, and that regulations may be required in regard to public and private fishing on the beds, and the proper treatment of the stock in the Government reserves. The adoption, before it is too late, of such scientific methods is probably the only way of restoring a depleted pearl-shell industry.

THE progress of Indian agriculture has hitherto been recorded in such publications as the Agricultural Ledger issued by the Reporter on Economic Products, or the bulletins circulated by certain of the provincial Governments; and reports on agricultural experiments have been included in official reports dealing chiefly with land records and administrative questions. The existing methods of publication were not suited to the altered conditions produced by the activity of the new department organised by Mr. James Mollison, first Inspector-General of Agriculture in India, and all interested in Indian agriculture will welcome the news that the Imperial and provincial Departments of Agriculture will henceforth publish a "Journal" and "Memoirs." The first number of the Journal has just been issued from the Agricultural Research Institute at Pusa. It is edited by the Inspector-General with the assistance of the Pusa staff, and will be published quarterly. The present number contains an interesting account of the development of the Indian Departments of Agriculture by Mr. F. G. Sly, officiating Inspector-General, and seven articles on questions connected with the cultivation of sugar-cane, cotton, and other Indian staples. The intention of the Government is that the Journal shall deal with agricultural subjects which are of interest to general readers—crops, insect pests, cattle breeding, irrigation, cooperative credit—while in a second publication, to be entitled "Memoirs of the Department of Agriculture in India," scientific work in agricultural chemistry, botany, &c., will be recorded. The Memoirs will be published as separate articles, and these will be arranged in series.

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Separate series will be issued for each of the chief divisions of science. Both publications will be freely illustrated.

A VERY valuable report by Dr. A. C. Houston on the bacteriological examination of milk has been issued by the London County Council, with a preface by Sir Shirley Murphy. The report is based on the examination of (a) twenty samples of specially selected milk from twenty separate healthy cows; (b) twenty samples of milk collected from purveyors' shops; (c) twenty samples collected from dairy shops; (d) twenty samples collected from churns at railway stations; and (e) twenty samples collected from the establishments of well known milk dealers. The samples under (a) served as a standard, while those under (b) and (c) were of milks of indifferent quality, in the main collected from poor neighbourhoods and premises known to be ill-adapted for the sale of milk. The various sources of pollution of milk are enumerated, and an important recommendation is made with regard to a temperature standard, viz. that all milk should be rapidly cooled below 10° C. and maintained at or below this temperature during the whole period of transit and sale in order to prevent the multiplication of bacteria. The following bacteriological standards are suggested:—(1) 1 c.cm. should not give evidence of the presence of *B. enteritidis sporogenes*; (2) 0.001 c.cm. should not give evidence of the presence of *B. coli*. (3) 0.0001 c.cm. should not give evidence of the presence of streptococci; (4) the primary sediments (after twenty-four hours) should not exceed 100 parts per 1,000,000; (5) the secondary sediment (after centrifugalisation) should not exceed 50 parts per 1,000,000. Finally, several reforms which may be considered immediately practicable are suggested for dealing with the milking, the conveyance of the milk, and the vending of the same.

AN editorial article in the *Indian Forester* (January) advocates the formation of forest museums in each forest division or in each province that may contain several divisions. In Europe the inception of such a scheme is found in Saxony, where each forest conservator is provided with a set of mounted specimens of the chief insect pests with instructions for dealing with them. In India the credit of starting collections of timber specimens and other forest produce for a conservator's museum is due to Mr. Gass, of the Coimbatore division, Madras. The collections for this division have been extended to serve for the three circles of the presidency, and a special building has been sanctioned for the purpose.

IN consequence of the drought that was experienced during the season 1904-5, particularly in Antigua, the experiments arranged by Dr. F. Watts on the chemical selection of sugar-canes in the Leeward Islands failed, but the experiments with different varieties of sugar-cane were carried out. In the report published as a separate part by the Imperial Department of Agriculture for the West Indies it is noted that the six canes giving the best results in Antigua were the same as in the previous year, thus confirming the good character of these canes. The experiments in St. Kitts did not agree so closely with those of previous years, this, no doubt, being caused by the irregularity of the rainfall in different districts.

At a research meeting of the Royal Geographical Society on March 9, a paper was read by Mr. J. L. Myres on the Alpine races in Europe. Rejecting Prof. Keane's theory of a North African origin, Mr. Myres said that the brachycephaly of the Alpine stock might have been de-



veloped locally, or might have immigrated from western Asia, but there was no reason to suppose that the area in which the race occurs in Europe was large enough or secluded enough to account for so considerable a change. The northern or steppe route into Europe was not available until the retreat of the ice-cap and the shrinkage of the Caspian, but south of the Black Sea there was a route, now concealed by submergences subsequent to the period with which he was dealing. In Anatolia the conditions were favourable for the development of a distinct type, and at the same time south-east Europe was partially isolated, and its climate rendered it little suitable for human habitation. *Homo alpinus* was tall in Albania, short in Central France; the dwarf broad-heads developed in south-eastern Europe, where the climate was severe, the giant broad-heads in Anatolia, where conditions were more favourable; and it was natural to find the latter to the east of the former, for they were driven out of Anatolia later, leaving scattered "Dinaric" populations east of the Sea of Azov, and throwing out colonies beyond the "Cevenoles." In favour of this hypothesis were the facts that (1) the fruit-culture of the European lake-dwelling peoples was characteristically Anatolian; (2) physically they were of the right type; and (3) even in classical times Anatolia was noted for this type of dwelling.

At the eighth International Geographical Congress, Mr. R. De C. Ward, of Harvard University, contributed a useful paper on a more rational treatment of climatology. He pointed out that the method of presenting climatic data in the usual tabulated form is unsatisfactory, because it does not bring out the cyclonic variations of different weather conditions experienced from day to day. He does not suggest any change in the recognised order of presentation, but he urges that wherever possible the cyclonic unit should be made the basis of summaries, as well as the diurnal, the monthly, the seasonal, and the annual unit; also that much more attention should be paid to an adequate verbal discussion. Over the greater portion of the equatorial zone, weather and climate are almost synonymous terms, but in the temperate zone, for instance, the regular diurnal changes are very frequently overshadowed by the changes due to the passage of cyclones and anticyclones. The author gives several clear illustrations, e.g. in mean monthly and mean annual ranges of temperature we have the sum of both periodic and non-periodic changes which occur during any month, irrespective of the question whether the maxima and minima all occurred under similar conditions, and thus we lose sight of a very important factor in climate; and similarly with regard to rainfall and other elements. More attention should be given to seasonal averages, to departures from the means, and even to the single occurrence of certain phenomena. A tribute is paid to the more rational treatment of climatology as evidenced by the beautiful charts by Dr. Buchan in Bartholomew's "Atlas of Meteorology"; but, valuable as such charts are, the author considers that the various weather elements which, taken together, make up climate should be summarised, not on the basis of the year or month only, but of the cyclone which controls them.

THE Journal of the Royal Sanitary Institute (No. 1, 1906) contains an interesting paper by Dr. W. N. Shaw, read before the conference on smoke abatement, and entitled "Is London Fog Inevitable?" The author pointed out that we do not know the actual course of events in the physical processes comprised in the origin and persistence

of fog, and referred to two important inquiries made under the superintendence of the Meteorological Council relating to the winters of 1901-2 and 1902-3. In the first report Captain Carpenter came to the conclusion that in winter London was never free from a smoke haze; for some months St. Paul's was invisible from the Victoria Tower at the times of observation, although in the following year conditions were more favourable. The most frequent cause of fog is the cooling of the surface by radiation under a clear sky; there is no limit to the extent of country that may be affected by the formation of fog under this condition. In the second winter, 1902-3, Mr. Lempfert assigned twenty-four cases out of thirty-nine dealt with to the effect of radiation, while eight were considered to consist practically of smoke alone. Thus about 20 per cent. of the London fogs in that year might have been avoided by the abatement of coal smoke, while the remainder depended upon physical processes which are beyond our control. Dr. Shaw remarks that one of the unsolved problems of this interesting subject is why the sun's heat does not dissipate the fog upon which it shines. It was found that the sunshine recorder at Bunhill Row during the month of December lost 83 per cent. of the sun's burning power, that at Westminster 61 per cent., and that at Kew 15 per cent., so that if the sun has any substantial power of dissipating early morning fog, the smoke of the London atmosphere must seriously interfere with its effect. The peculiar manner in which the density varies from place to place, and various other points about London fog, await further investigation.

THE Geological Survey of Alabama has issued a revised map of the south-eastern part of the Cahaba coalfield, embodying the results of investigations made since the publication of the original map in 1890. The vertical section shows fifteen seams, mostly of small size, in about 1800 feet of measures.

STATISTICS of the quantity and value of each of the important minerals raised in India have been published by Mr. T. H. Holland, F.R.S., in the Records of the Geological Survey of India (1906, part i.). Compared with 1903, an increase of nearly 7 per cent. is shown in the total value of mineral production. The production of coal, 8,216,706 tons, exceeded all previous records. There were also produced 3596 tons of chromite, 286 carats of diamonds, 618,746 oz. of gold, 3256 tons of graphite, 3778 cwt. of jadeite, 1315 tons of magnesite, 150,297 tons of manganese ore, 19,575 cwt. of mica, 118,491,382 gallons of petroleum, 265,901 carats of rubies, 1,170,205 tons of salt, 315,558 cwt. of refined saltpetre, and 1388 cwt. of tin ore. Statistics of the production of alum, amber, asbestos, borax, building stone, clay, gypsum, limestone, marble, ochre, and slate are incomplete.

IN the Records of the Geological Survey of India (vol. xxxiii., part i.) Mr. E. Vredenburg deals with Pleistocene movement as indicated by irregularities of gradient of the Narbada and other rivers in the Indian peninsula. He gives a very striking photograph of the falls of the Narbada at Dhári. Recent changes in the course of the Nam-tu River, in the northern Shan States, are described by Mr. T. D. La Touche, and the same author gives a note on the natural bridge in the Gokteik Gorge, advantage of which was taken in selecting a site for the railway bridge on the Mandalay-Lashio line. Lastly, Mr. P. N. Bose gives an account of the geology and mineral resources of the Narnaul district, in the Patiala State. The minerals

of economic value met with include iron ores, mica, copper ores, manganese, rutile, as well as limestone and other building stones.

It has always been a difficult matter to obtain pure lithium by the electrolysis of fused lithium chloride, which has been the method employed up to the present, and was originally used by Bunsen. In the *Zeitschrift für Elektrochemie* of March 9, Messrs. O. Ruff and O. Johannsen describe a process which they have satisfactorily worked out for its preparation by the electrolysis of lithium bromide. They prepare the lithium bromide by the action of hydrobromic acid on the carbonate. The electrolysing vessel is of copper, and is partially water-jacketed in order that the walls may be kept cool and thus protected by a coating of solid lithium bromide. The anode is of retort carbon, and the two kathodes of iron wire 4 mm. in diameter. The electrolyte consists of lithium bromide containing 15 per cent. of lithium chloride. A current of 100 amperes at 10 volts is employed, and the yield of metallic lithium is about 80 per cent. of the theory. From time to time the metal as it collects on the iron kathode is removed with a flat iron spoon, and at once placed on a cold stone surface, where it rapidly solidifies. Determinations of the melting point showed it to be  $180^{\circ}$ , which agrees with that found by Bunsen in the middle of the last century.

A SIMPLE arrangement for purifying mercury which is likely to prove of considerable service is described by Messrs. G. A. Hulett and H. D. Minchin in the *Physical Review* (vol. xxi., No. 6). The method consists in distilling the mercury in a Wurtz flask under diminished pressure, allowing bubbles of air to pass through the mercury during distillation so as to prevent bumping. The air also serves the very useful purpose of oxidising any metallic impurity, such as zinc, cadmium, or lead, which otherwise would contaminate the distillate. Ordinary distillation *in vacuo* of mercury containing one of these metals does not suffice to remove the impurity, but by using the method described an amalgam of zinc can be made to yield pure mercury in a single distillation. An electrical method of ascertaining the presence of one part of zinc in ten billion parts of mercury is described incidentally.

THE March number of the *Geographical Journal* contains an interesting table by Miss Nora E. MacMunn, compiled from planimetric measurements made on an orographical map at the School of Geography, Oxford, showing the areas of the orographical regions of England and Wales. As a rule, the plains have been measured to the 250-foot contour line, and the hills have not been considered to begin below that level. The average height of England and Wales, calculated from these measurements, is 385 feet. Of the total 58,324.3 square miles constituting the area of England and Wales, 26,481.6, or 45.4 per cent., are under 250 feet in elevation; 16,364.5, or 28 per cent., are between 250 feet and 500 feet; 10,476.3, or 18 per cent., are between 500 feet and 1000 feet; 4698.3, or 8 per cent., are between 1000 feet and 2000 feet; 300.0, or 0.5 per cent., are between 2000 feet and 3000 feet; and 3.6 are more than 3000 feet above sea-level.

MR. FROWDE is about to publish for the Radcliffe trustees a "Catalogue of 1772 Stars, chiefly comprised within the Zone  $85^{\circ}$ – $90^{\circ}$  N.P.D., for the Epoch 1900," deduced from observations made at the Radcliffe Observatory, Oxford, during the years 1894–1903, under the direction of Dr. A. A. Rambaut, F.R.S.

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## OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NEW COMET (1906c).—A telegram from Kiel announces the discovery of a new comet by Mr. Ross, of Melbourne, on March 18.

Its position at 7h. 36.1m. (Melbourne M.T.) was

R.A. = 2h. 3m. 52s., dec. =  $-7^{\circ} 41'$ ,

which is about half-way between  $\zeta$  and  $\theta$  Ceti.

A second telegram from Kiel states that Mr. Morgan observed the comet at Glasgow (U.S.A.) on March 19. Its position at 7h. 40.9m. (Glasgow M.T.) was

R.A. = 2h. 9m. 31.4s., dec. =  $-5^{\circ} 47' 25''$ .

The comet is stated to be of about the eighth magnitude.

COMET 1906b.—Numerous observations of comet 1906b are reported in No. 4078 of the *Astronomische Nachrichten*.

Observing at Bamberg on March 4, the day after its discovery, Prof. Hartwig found that the comet had a diameter of about  $10''$  and a central condensation of about magnitude 11.0. The same magnitude was recorded by Dr. Wirtz at Strassburg on March 6.

Prof. Max Wolf reports that the comet is easily seen on his plates, and shows a tail of about half a degree in length; with the 10-inch refractor a sharp nucleus was observed on March 4, and it was seen that the tail extended to the north-west.

COMET 1906a (BROOKS).—In No. 4078 of the *Astronomische Nachrichten* Herr M. Ebell gives a further daily ephemeris for comet 1906a, extending from March 16 to May 3. The following is an extract therefrom:—

### Ephemeris 12h. M.T. Berlin.

1906	$\alpha$ (true) h. m. s.			$\delta$ (true)	$\log r$	$\log \Delta$	Bright- ness
Mar. 20 ...	5	41	5 ...	+46 31 ...	0.2618 ...	0.1986 ...	0.25
24 ...	5	42	18 ...	+43 47 ...	0.2710 ...	0.2284 ...	0.21
28 ...	5	43	58 ...	+41 23 ...	0.2801 ...	0.2567 ...	0.18
April 1 ...	5	45	57 ...	+39 18 ...	0.2891 ...	0.2835 ...	0.15
5 ...	5	48	10 ...	+37 27 ...	0.2981 ...	0.3088 ...	0.13
9 ...	5	50	34 ...	+35 48 ...	0.3069 ...	0.3325 ...	0.11

Brightness on January 27 = 1.0 = about 10.0 m.

Observing at Arcetri on January 31, Dr. Abetti found that the comet had a central nucleus of about the tenth magnitude or a little greater, and that the surrounding nebulosity extended for about  $2'$ , chiefly towards the direction of lesser right ascension.

On March 22 this comet will pass near to  $\beta$  Aurigæ, about 11m. (R.A.) to the west, whilst on April 5 it will be only about 5m. west of  $\theta$  Aurigæ.

A PROGRAMME OF SOLAR RESEARCH.—Now that the Mount Wilson Solar Observatory has fairly settled down to work, Prof. Hale has revised his "Programme of Solar Research," published several years ago, and gives an outline of the revised programme in No. 1, vol. xxiii., of the *Astrophysical Journal*.

Two principal studies are to be prosecuted. First, a study of the sun as a typical star, with reference to stellar evolution; secondly, the relationship between solar and terrestrial phenomena.

These studies are divided into five groups, each of which contains a number of subdivisions. The five main groups are:—(1) direct photography; (2) spectroheliograph researches; (3) spectroscopic investigations; (4) studies of the total solar radiation; and (5) allied laboratory investigations.

Most of these are now being prosecuted at Mount Wilson, and Prof. Hale points out that there are many other solar investigations which call for attention, and of which many may be carried out by amateur observers with modest equipments.

HARVARD COLLEGE OBSERVATORY.—Prof. Pickering's report of the work done at Harvard College Observatory during the year ending September 30, 1905, is the sixtieth of the series, and contains the record of an immense amount of work, too much even to summarise here.

One or two special features may, however, be mentioned. Eighteen eclipses of Jupiter's satellites and eight occultations of stars by the moon were observed with the 11-inch Draper telescope. Three of the occultations were photo-